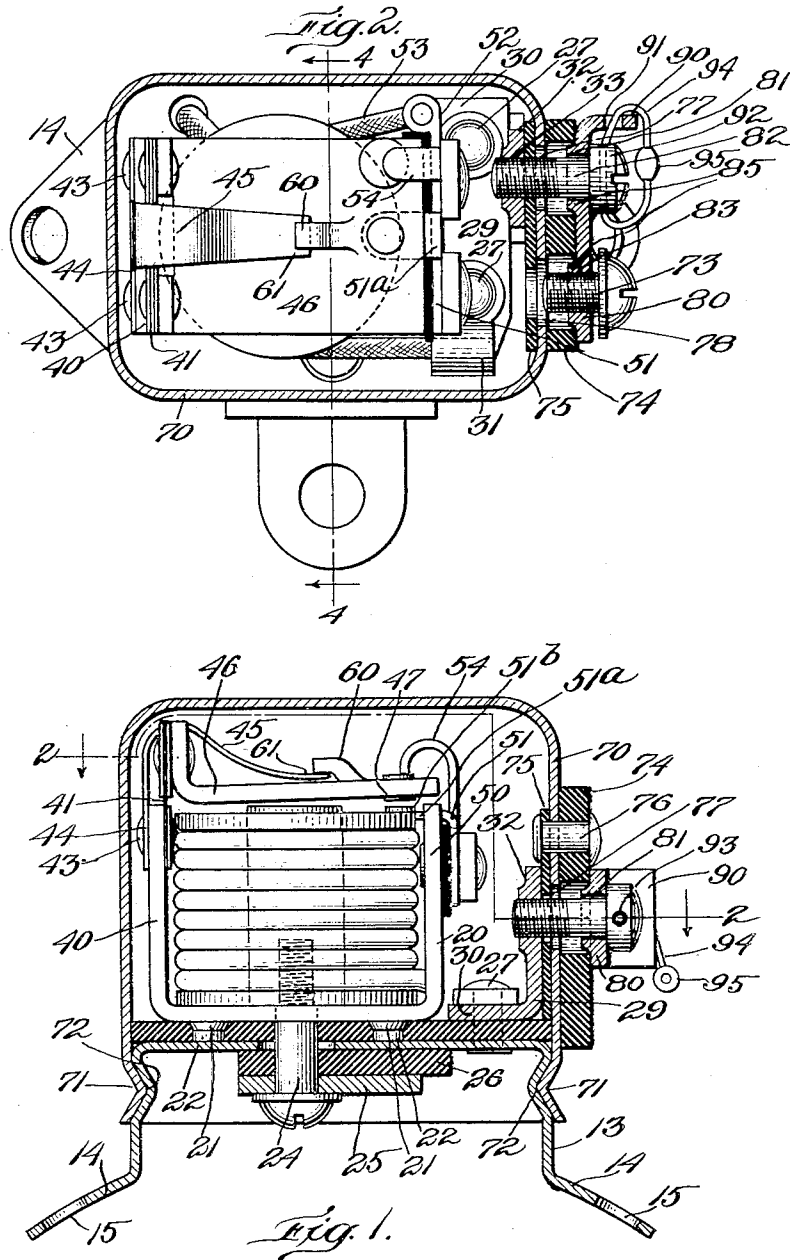


W. B. MOSES.
ELECTROMAGNETIC SWITCH.
APPLICATION FILED AUG. 18, 1919.

1,373,015.

Patented Mar. 29, 1921.

2 SHEETS—SHEET 1.



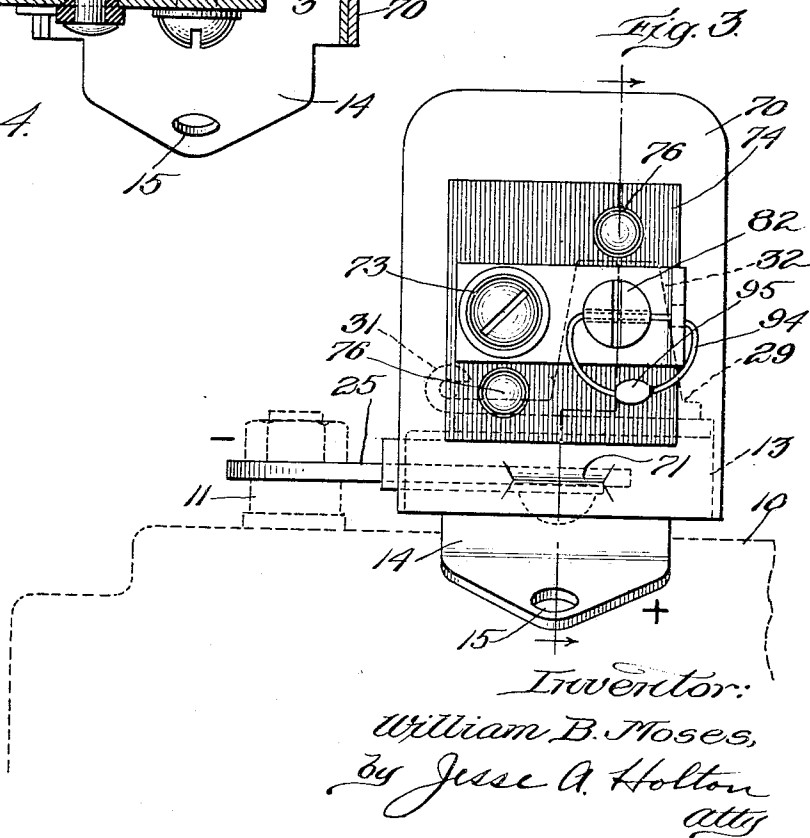
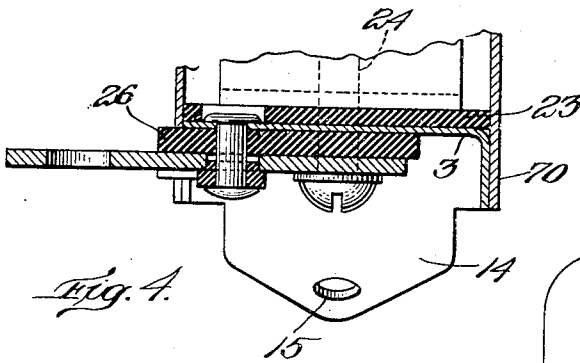
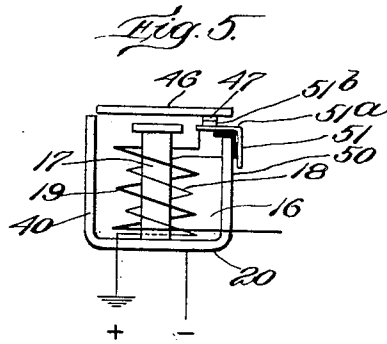
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by Jesse A. Holton
att'y

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UNITED STATES PATENT OFFICE.

WILLIAM B. MOSES, OF WATERTOWN, MASSACHUSETTS, ASSIGNOR TO GRAY & DAVIS
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ELECTROMAGNETIC SWITCH.

1,373,015.

Specification of Letters Patent.

Patented Mar. 29, 1921.

Application filed August 18, 1919. Serial No. 318,158.

To all whom it may concern:

Be it known that I, WILLIAM B. MOSES, a citizen of the United States, residing at Watertown, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Electromagnetic Switches, of which the following is a clear, full, and exact description.

This invention relates to electro-magnetic switches and with regard to certain more specific features thereof to so called "cut-out" switches for safeguarding a storage battery when the latter is included in an electric circuit with a generator, so that should the generator voltage fall below a certain value the circuit will be opened automatically.

One of the objects of the invention is to provide an extremely compact switch of the character above mentioned.

It is another object of the invention to provide an improved construction whereby the switch parts may be assembled or disassembled with ease and rapidity, said construction comprising means having provision for sealing the parts in assembled position.

Other objects will be in part obvious and in part pointed out in the following description.

The invention accordingly consists of the various features of construction, combinations of elements and arrangements of parts which will be exemplified by the construction hereinafter set forth and the scope of the application of which will be indicated by the following claims.

In the accompanying drawings wherein is shown one of various possible embodiments of the invention:

Figure 1 is a view in vertical section of an improved switch as specified.

Fig. 2 is a view taken on the line 2—2 of Fig. 1.

Fig. 3 is a view in end elevation.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2 and

Fig. 5 is a diagrammatic view.

Referring now more particularly to the drawings, there is indicated at 10 a generator having its positive brush grounded to its frame and its negative brush connected to a terminal post 11 projecting through the frame and insulated therefrom. The generator is shown in the present case as of "round type" and a switch base 13 of sheet

metal is provided with attaching feet 14, the latter being apertured at 15 to receive screws for securing the base to the dynamo frame. It is to be understood, however, that the switch parts to be described, comprising the electromagnet, its armature and the switch contacts are secured to the base preferably before the latter is attached to the frame.

The electromagnet 16 shown diagrammatically in Fig. 5 comprises a core 17 wound with a fine wire constituting a shunt winding 18, and with a coarse wire constituting a current or series winding 19. A U-shaped magnet cage 20 of stamped metal is adapted to receive the magnet, and the base of the cage is stamped with locating projections 21 designed to interfit with recesses 22 formed in a base sheet 23 of insulation. The lower end of the core 17 is tapped to receive a screw 24 which latter passes through a connector strip 25, insulated from base 13 by an insulating plate 26, and serves to secure the magnet and cage in position.

The insulating base sheet 23 is also held in position on the base 13 by two rivets 27 which further serve to attach to the base sheet 23 an angle member 29 of electrical conductivity. This angle member has a portion 30 conforming to the base sheet, which portion terminates in a terminal socket 31 for one end of the series coil. It has also an upstanding portion 32 provided with a threaded aperture 33 for purposes which will be hereinafter described.

One upstanding wall 40 of the magnet cage 20 has attached thereto a thin flexible metal strip 41, the lower portion of which is riveted as at 43 to the wall 40 at the same time that one end 44 of a spring finger 45 is attached. The upper portion of the strip or hinge 41 has fixed to it the movable armature 46 which carries one contact 47 of the switch.

The other upstanding wall 50 of the magnet cage has mounted thereon, although insulated therefrom, a conductor member 51. This member is formed with a lateral extension 51^a carrying the other, or fixed contact 51^b of the switch. At one end 52 the conductor member 51 is formed with a terminal socket for the other end 53 of the series coil 19, and the conductor member is also provided with a finger 54 extending upwardly then crooked downwardly to provide means for limiting the movement of the armature 46 under the influence of the

spring finger 45. Finger 54 is insulated from the wall 50 as shown in Figs. 1 and 2 of the drawings.

The armature is preferably a stamping of sheet metal having struck from its flat body a catch 60 under which the free end 61 of the spring finger may be laterally flexed without permanent distortion of the parts. When so positioned beneath the catch the spring is depressed from its natural inclination and serves to urge the armature against the stop provided by finger 54. The contacts are thus disengaged.

The present invention is directed among other things to the production of an extremely compact "cut-out" switch and one in which the operations of assembly and disassembly may be simplified in great degree. Toward these ends the parts are arranged as herein before set forth and a cover or casing 70 is provided preferably of extruded metal having locking projections 71 formed therein adapted to yield over the floor of the base 13 and spring into locking position in depressions 72 formed in the base. The cover or casing 70 is adapted to carry the circuit terminal 73 thereby eliminating the necessity of providing space on the base for this terminal. To this end outer and inner insulating plates 74 and 75 are fixed to a wall of the casing as by rivets 76. These plates are apertured concentrically with clearance apertures 77 and 78 in the casing wall and the outer plate 74 is adapted to receive a conductor plate 80. This plate 80 is bored at 81 to receive the shank of a conducting, attaching and sealing screw 82 and is also bored and tapped at 83 to receive the circuit terminal screw 73. The bores referred to are made through bosses 85 formed on the inner wall of the plate 80 and which project into the apertures in the outer insulating plate serving to cause the plate 80 to properly register with the latter said plate. As heretofore stated the angle member 29 attached to the base has an upstanding portion 32 which is provided with a threaded aperture 33. Into this aperture the conducting, attaching and sealing screw 82 is threaded thereby securing the terminal or conductor plate 80 to the insulated wall of the casing, also securing the casing against removal from the base (unless the screw be withdrawn) and providing electrical communication from the terminal plate 80 to the angle member 29. The terminal plate 80 is formed with a lateral extension 90 provided with a small hole 91 and the head 92 of the screw 82 is bored as at 93. A wire 94 of a seal 95 is passed through the hole 91 and bore 93 and its ends locked together as indicated in Fig. 2.

In assembling the parts of the device the magnet and its associated parts carried by or in the U-shaped cage are located as a

unit on the base by causing registration of the lugs 21 with the openings 22 in the insulation sheet of the base. The angle member 29 having been assembled with the base 13 and the insulation sheet by means of rivets 27, screw 24 serves to connect the two minor assemblies and also the insulation 26 and conductor 25. It is optional with the workman to assemble this product with the generator by attaching the conductor to the stud 11 and passing screws through the screw holes 15 or to attach the cover portion 70 carrying the outer and inner insulating plates 74 and 75. The final step involves the attaching of the terminal plate 74 and the securing of same in position by passing the screw 82, through the casing and threading it into the angle member 29 registering the holes in the screw head and terminal plates and applying the seal. Should it be desired to vary the effect of the spring 45 on the armature the seal may be broken, the screw 82 and the casing removed. The spring finger is sufficiently flexible to permit its free end to be twisted sidewise from under the catch 60 whereupon it is released to be bent to secure the desired action. In the same manner it may be restored to position under the catch.

In operation the switch resembles others well known in the art. When the generator develops speed and "builds up" the shunt or actuating coil is energized, the magnetic attraction overcoming the influence of the spring on the armature and causing engagement of the contacts. When the contacts are engaged a circuit is closed including the generator, a storage battery and the series or holding coil 19. While the speed of the generator is maintained at or above a certain value the action of the series coil is cumulative with that of the shunt coil but should the generator speed fall below a certain value of its voltage drop below the battery voltage for any reason the current flow in the series coil is reversed owing to battery discharge and opposes the effect of the shunt coil whereupon the spring moves the armature to disengage the contacts. No claim is made herein for this action as it is old and well known to operate the armature in the manner set forth but the action involves a problem of balance of forces mechanical and electrical and great difficulties have been experienced in working out a mechanism which will yield to the magnetic attraction of proper value and yet be strong and active enough to insure restoration of the armature immediately the battery assumes a condition of discharge. There is such great variation in the strength and action of springs intended to be uniform that the necessity for adjustment is general throughout devices of this general character. The present invention provides an ex-

tremely compact arrangement and facilitates adjustment in addition to which the cost of manufacture is greatly reduced and ease of assembly obtained. While considering these advantages it should be noted that a single screw 92 serves to attach the line terminal, serves as a conductor to the fixed portion of the organization and serves to hold the casing against removal and provides means adapted to be sealed to prevent removal of the casing without indication.

As many changes might be made in the above construction and many apparently widely different embodiments of the invention might be made without departing from the scope thereof it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

To secure the desired effect in illustrating the device has been reproduced greatly enlarged whereas actually it is an extremely small and compact organization of parts.

What I claim is:

1. In apparatus of the character described in combination, an electro-magnetic switch device comprising a winding, a supporting base and a removable cover, a line terminal, and means adapted to penetrate said cover when the latter is assembled with said base, said means serving to detachably attach said terminal to said cover and complete an electrical circuit to said winding.

2. In apparatus of the character described in combination, an electro-magnetic switch device comprising a winding, a supporting base, a conductor member to which said winding is connected, a cover adapted to fit over said winding, said cover having an aperture, a second conductor member having terminal means for a line and adapted to be mounted on the exterior of said casing, and means passing through said aperture for mechanically and electrically connecting said conductor members.

3. In apparatus of the character described in combination, an electro-magnetic switch device comprising a winding, a supporting base, a conductor member to which said winding is connected, a cover adapted to fit over said winding, said cover having an aperture, a second conductor member having terminal means for a line and adapted to be mounted on the exterior of said casing, and means passing through said aperture for mechanically and electrically connecting said conductor members, said means having provision for receiving a seal.

4. In apparatus of the character described in combination, a supporting base adapted to be secured to a generator, an electro-magnet mounted on said base and comprising an armature carrying a contact, a fixed contact, a winding, one end of which is con-

nected to said fixed contact, a conductor member in fixed relation to said base and to which the other end of said winding is connected, a cover adapted to fit over said electro-magnet and said conductor member, said cover having a portion registering with a portion of said conductor member, a second conductor member having a line connection, securing means mechanically and electrically connecting said conductor members and passing through said cover to prevent removal thereof, and means for sealing said securing means in position to prevent removal of said cover.

5. In apparatus of the character described, in combination an electro-magnetic switch device, a support therefor, a conductor in fixed relation to said support, a cover adapted to fit over said switch device and conductor, a line terminal adapted to be secured to the exterior of said casing, and means to electrically connect said terminal to said conductor and hold said cover against removal.

6. In apparatus of the character described, in combination, an electro-magnetic switch device comprising a base, a winding, and a metal conductor member in fixed relation with said base, said conductor member having an upstanding portion; a casing adapted to be detachably fitted over said switch device, line terminal means adapted to be detachably fitted to the exterior of said casing, and securing means for said terminal means passing from said terminal means through said casing to the upstanding portion of said conductor member adapted to complete the electrical circuit therebetween, and hold the casing against removal.

7. In apparatus of the character described, in combination, an electro-magnetic switch device comprising a base, a winding, and a metal conductor member in fixed relation with said base, said conductor member having an upstanding portion, a casing adapted to be detachably fitted over said switch device, line terminal means adapted to be detachably fitted to the exterior of said casing, and securing means for said terminal means passing from said terminal means through said casing to the upstanding portion of said conductor member adapted to complete the electrical circuit therebetween and hold the casing against removal, and means for sealing said holding means in holding position.

8. In a device of the character described, in combination, an electromagnetic cut out switch device mounted on a base and protected by a removable cover, and means forming a part of the electrical connection to said switch, projecting through said cover and detachably connecting with the base so as to prevent removal of said cover without first removing said means.

WILLIAM B. MOSES.